What Is Claimed Is:

1. A system that demultiplexes an RF signal including at least two nested sets of frequency division multiplexed (FDM) channels extending over a bandwidth B, the system comprising:

a baseband converter that converts the RF signal to a baseband signal wherein a center frequency of said baseband signal is offset from DC by an amount equal to an integer multiple of the channel spacing of a widest of the nested FDM channels;

an analog to digital converter (ADC) that converts said baseband signal to a digital signal at a sampling rate equal to four times said offset;

a complex baseband digital signal generator, coupled to said analog to digital converter, that performs a half-band complex bandshift of said digital signal and that filters said half-band complex bandshifted signal with a two to one decimating, symmetric, half-band finite impulse response (FIR) filter to generate a complex baseband digital signal;

a k stage sub-band definition network, coupled to said complex baseband digital signal generator, that divides said complex baseband digital signal into k sets of sub-band output signals by sub-band definition filters,

wherein each stage of said k stage sub-band definition network comprises a plurality of parallel polyphase-discrete Fourier transform (PPF-DFT) filter banks,

wherein said PPF-DFT filter banks, where appropriate to align sub-band signals with filter pass-bands of said PPF-DFT filter banks, are preceded by at least one of

a quarter-band, and

a sixth-band complex bandshift,

and are followed by an eighth-band complex bandshift; and

sub-band demultiplexers, coupled to said k sets of sub-band output signals of said k stage sub-band definition network, that demultiplex each of said sub-band output signals to obtain k sets of demultiplexed sub-band channel signals.

2. The system according to claim 1, wherein said complex baseband digital signal generator is configured to generate said half-band complex bandshift without the need for multipliers.

3. The system according to claim 1, wherein said k stage sub-band definition network is operative to at least one of

generate said quarter-band complex bandshift wherein said quarter-band complex bandshift comprises, on average, one-half of a number of multiplications normally needed; and

generate said sixth-band complex bandshift wherein said sixth-band complex bandshift comprises, on average, one-third of a number of multiplications normally needed.

4. The system according to claim 1, wherein k is a number of stages, of said k stage sub-band definition network and is equal to a number of unique nested sets of FDM channels minus one.

5. The system according to claim 1, wherein a section of said each stage of said k stage sub-band definition network comprises an upper filter bank and a lower filter bank of said plurality of PPF-DFT filter banks that process an input signal band of said section to produce even and odd sub-band output signals of said each stage.

6. The system according to claim 1, wherein at least one of said sub-band demultiplexers, said complex baseband digital signal generator, and said sub-band definition network, are

implemented in a complementary metal oxide semiconductor (CMOS) integrated circuit (IC).

7. The system according to claim 1, further comprising

a digital logic clock signal that is operative to be disabled in branches of at least one of said k stage sub-band definition network and said sub-band demultiplexers, whenever said branches contain only inactive channels.

8. A system for demultiplexing an RF signal including at least two nested sets of frequency division multiplexed (FDM) channels extending over a bandwidth B, the system comprising:

baseband converting means for converting the RF signal to a baseband signal wherein a center frequency of said baseband signal is offset from DC by an amount equal to an integer multiple of the channel spacing of a widest of the nested FDM channels;

analog to digital converting means for converting said baseband signal to a digital signal at a sampling rate equal to four times said offset;

complex baseband digital signal generating means, coupled to said analog to digital converting means, for performing a half-band complex bandshift of said digital signal and for filtering said half-band complex bandshifted signal with a two to one decimating, symmetric, half-band finite impulse response (FIR) filter means for generating a complex baseband digital signal;

k stage sub-band definition network means, coupled to said complex baseband digital signal generating means, for dividing said complex baseband digital signal into k sets of sub-band output signals, means for outputting sub-band output signals by sub-band definition filtering,

wherein each stage of said k stage sub-band definition network means comprises a

plurality of parallel polyphase-discrete Fourier transform (PPF-DFT) filter bank means for filtering,

wherein said PPF-DFT filter bank means, where appropriate to align sub-band signals with filter pass-bands of said PPF-DFT filter bank means comprise at least one of

quarter-band means for performing a preceding quarter-band complex bandshift, and

sixth-band means for performing a preceding sixth-band complex bandshift,

and are followed by eighth-band means for performing a following eighth-band complex bandshift; and

sub-band demultiplexing means, coupled to said k sets of said sub-band channel output signal means of said k stage sub-band definition network means, for demultiplexing each of said sub-band output signal means to obtain k sets of demultiplexed sub-band channel signal means for providing demultiplexed FDM channel signals.

9. The system according to claim 8, wherein said complex baseband digital signal generating means is further configured for generating said half-band complex bandshift without the need for multipliers.

10. The system according to claim 8, wherein said k stage sub-band definition network means further comprises at least one of

generating said quarter-band means wherein said quarter-band means uses, on average, one-half of the multiplications normally needed; and

generating said sixth-band means wherein said sixth-band means uses, on average, one-

third of the multiplications normally needed.

11. The system according to claim 8, wherein k is a number of stages, of said k stage sub-band definition network means and is equal to a number of unique nested sets of FDM channels minus one.

12. The system according to claim 8, wherein a section of said each stage of said k stage sub-band definition network means comprises an upper filter bank means and a lower filter bank means of said plurality of PPF-DFT filter bank means for processing an input signal band of said section and for producing an even sub-band output signal and an odd sub-band output signal of said each stage.

13. The system according to claim 8, wherein at least one of said complex baseband digital signal generating means, said sub-band definition network means, and said sub-band demultiplexing means are implemented in a complementary metal oxide semiconductor (CMOS) integrated circuit.

14. The system according to claim 8, further comprising digital logic clock signal disabling means for disabling a clock signal in branches of at least one of said k stage sub-band definition network means and said sub-band demultiplexing means, whenever said branches comprise only inactive channels.

15. A method for demultiplexing an RF signal including at least two nested sets of frequency division multiplexed (FDM) channels extending over a bandwidth B, the method comprising:

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converting the RF signal to a baseband signal wherein a center frequency of said baseband signal is offset from DC by an amount equal to an integer multiple of the channel spacing of a widest of the nested FDM channels;

converting said baseband signal to a digital signal at a sampling rate equal to four times said offset;

performing a half-band complex bandshift of said digital signal, and filtering said half-band complex bandshifted signal with a two to one decimating, symmetric, half-band finite impulse response (FIR) filter, thereby obtaining a complex baseband digital signal;

dividing said complex baseband digital signal into k sets of sub-band output signals, outputting sub-band output signals by sub-band definition filtering, including filtering using a plurality of parallel polyphase-discrete Fourier transform (PPF-DFT) filter banks, and aligning, where appropriate sub-band signals with filter pass-bands of said PPF-DFT filter bank means comprising at least one of

performing a preceding quarter-band complex bandshift, and

performing a preceding sixth-band complex bandshift,

and performing a following eighth-band complex bandshift; and

demultiplexing each of said sub-band output signal means to obtain k sets of demultiplexed sub-band channel signals.